

Amendments of the claims under Article 19(1)(Rule 46)

CLAIMS

1. A power control device for controlling a power of a light source of an optical beam directed to an optical medium having a recording track which has been wobble-processed, comprising:

a reflected light detector for extracting a wobble signal component from a tracking error signal obtained from the optical medium when irradiated by an optical beam which is following a track;

an arithmetic unit for calculating, from an amplitude value of the wobble signal component, a transmissivity of light transmitted from a disk surface to a recording layer or an amount of directed light on the recording layer of the medium; and

power control means for controlling the power of the light source for emission based on a calculation result produced by the arithmetic unit.

2. (Canceled)

3. A power control device according to claim 1, wherein the power control means controls a single-value control power or a multiple-value control power based on the calculation result of the arithmetic unit.

4. A power control device according to claim 1, wherein the power control means controls a duration of a recording pulse during recording.

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5. A power control device according to claim 1, wherein the arithmetic unit calculates a reference value from the detected wobble signal amplitude, and uses the reference value and the wobble signal amplitude in a calculation process.

6. A power control device according to claim 5, wherein the arithmetic unit calculates the reference value for each of the attributes of a track, presence/absence of data in the track, recording/reproduction states of an apparatus, and combinations thereof, and selectively uses the reference value according to conditions such as the attributes of a track followed by the optical beam, presence/absence of data in the track, recording/reproduction states of the apparatus, and combinations thereof.

7. A power control device according to claim 5, wherein when controlling a power different from that determined when the reference value is obtained, the arithmetic unit corrects the reference value and the detected wobble signal amplitude according to the different power and performs a calculation process.

8. A power control device according to claim 5, wherein the power control means determines whether control is performed, not performed, or stopped, or changes control modes according to a time period during which control works or an amount of a power to be controlled.

9. A power control device according to claim 8, wherein the power to be controlled is used for reproducing data contained in the track.

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10. A power control device according to claim 8, wherein the power to be controlled is used for recording or erasing data in the track.

11. An optical disk apparatus for recording or reproduction on an optical disk including a track in which a recording region is wobble-processed, comprising:

optical means for reading information from the optical disk or recording information in the optical disk;

control means for controlling the optical means;

signal generation means for generating a tracking error signal indicating a scanning state of the optical means on the track of the optical disk;

extraction means for extracting a wobble signal component from the tracking error signal;

amplitude detection means for detecting an amplitude of the wobble signal component extracted by the extraction means;

a bias generation circuit for generating a bias voltage based on an output of the amplitude detection means;

an arithmetic unit for outputting a calculation result obtained from the bias voltage generated by the bias generation circuit and an output voltage of the amplitude detection means according to a predetermined calculation rule; and

recording power control means for controlling recording power during recording data,

wherein during recording, the recording power is controlled based on the calculation result obtained by the arithmetic unit.

12. An optical disk apparatus according to claim 11, wherein:

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the optical disk apparatus is capable of recording data in a guiding groove portion and an inter-guiding groove portion of the optical disk;

the optical disk apparatus further comprises identification means for identifying whether a track scanned by the optical means is in the guiding groove portion or the inter-guiding groove portion; and

the bias generation circuit generates two types of bias voltages, the bias voltage for recording in the guiding groove portion and a bias voltage for recording in the inter-guiding groove portion, based on an output signal of the identification means.

13. An optical disk apparatus according to claim 11, wherein the bias generation circuit includes a low-pass filter and generates an average value of an output of the amplitude detection means or a bias voltage corresponding to a gradual change in amplitude on the order of a rotational component of a disk.

14. An optical disk apparatus according to claim 11, wherein the calculation rule of the arithmetic unit obtains a difference by subtracting the bias voltage generated by the bias generation circuit from the output voltage of the amplitude detection means; assumes the voltage generated by the bias generation circuit as being "1" and obtains a ratio of the difference to the voltage generated by the bias generation circuit; and according to the result, a current laser emission value is output as it is, or a value equivalent to the ratio of the difference is added to or subtracted from the current laser emission value which is assumed as being "1", and a value obtained by the addition/subtraction is output as a result.

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15. An optical disk apparatus according to claim 11, further comprising optimum power detection means for detecting an optimum power during recording, wherein an amplitude of a wobble signal component is detected while recording is performed at the optimum power determined by the optimum power detection means, and power control is performed based on the calculation result of the arithmetic unit.

16. An optical disk apparatus according to claim 15, wherein in a learning process for the bias generation circuit, recording is performed only with the optimum power determined by the optimum power detection means, and an average value of a wobble signal amplitude voltage during the recording is used as an optimum bias voltage or an initial value of the bias voltage.

17. An optical disk apparatus according to claim 15, wherein when a data error is detected in a data check operation immediately after data has been recorded, power control is conducted based on the calculation result of the arithmetic unit so as to perform a recording operation again.

18. An optical disk apparatus according to claim 15, wherein, in the process of recording at an optimum power determined by the optimum power detection means and further recording with power control based on the calculation result of the arithmetic unit, when a set power for recording exceeds a predetermined range, the apparatus provides a cautionary alarm about such being an abnormality of the optical disk or the apparatus.

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19. An optical disk apparatus according to claim 11, wherein in the process of recording with power control based on the calculation result of the arithmetic unit, when a set power for recording exceeds a predetermined range for a predetermined time period, the apparatus provides a cautionary alarm about such being as an abnormality of the optical disk or the apparatus.

20. An optical disk apparatus according to claim 11, wherein in the process of recording with power control based on the calculation result of the arithmetic unit, when a set power for recording exceeds a predetermined range for a predetermined time period, a portion in which the recording has been performed is treated as being inappropriate for recording.

21. An optical disk apparatus according to claim 11, wherein the calculation rule of the arithmetic unit assumes the bias voltage generated by the bias generation circuit as being "1", and provides a value obtained by adding "1" to a difference between "1" and the output voltage of the amplitude detection means as a calculation result.

22. An optical disk apparatus according to claim 11, wherein the calculation rule of the arithmetic unit assumes that the bias voltage generated by the bias generation circuit is "1", calculates a positive square root of the output voltage generated by the amplitude detection means, and provides a value obtained by adding "1" to a difference between a value of the positive square root and "1" as a calculation result.

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23. An optical disk apparatus according to claim 11, wherein the calculation rule of the arithmetic unit assumes that the bias voltage generated by the bias generation circuit as being "1", calculates a positive square root of the output voltage generated by the amplitude detection means, and provides a reciprocal of the positive square root as a calculation result.

24. An optical disk apparatus according to claim 11, wherein:

the arithmetic unit outputs a calculation result when a difference between the bias voltage generated by the bias generation circuit which is an input to the arithmetic unit and the output voltage generated by the amplitude detection means exceeds a predetermined range; and

the recording power control means conducts power control based on the calculation result of the arithmetic unit.

25. (Canceled)

26. An optical disk apparatus for recording or reproduction on an optical disk including a track in which a recording region is wobble-processed, comprising:

optical means for reading information from the optical disk or recording information in the optical disk;

control means for controlling the optical means;

signal generation means for generating a tracking error signal obtained when the optical means follows the track of the optical disk;

detection means for detecting attributes of the track followed by the optical means which includes presence/absence of information;

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extraction means for extracting a wobble signal component from the tracking error signal;

amplitude detection means for detecting an amplitude of the wobble signal component extracted by the extraction means;

reference value generation means for generating a reference value for each attribute of the track based on the attributes of the track which have been detected by the attribute detection means and an output of the amplitude detection means;

an arithmetic unit for calculating a transmissivity of light transmitted from a disk surface to a recording layer or an amount of directed light on the recording layer of the medium from the reference value generated by the reference value generation means and the output voltage of the amplitude detection means, and outputting required power of a light source calculated based on a value of the transmissivity or a value of the amount of directed light as a calculation result; and

power control means for controlling the power of the light source of an optical beam spot directed to the optical disk,

wherein the recording power control means controls the power of the light source in a manner recited in claims 5-10 based on the calculation result obtained by the arithmetic unit.

27. (Canceled)

28. An optical disk apparatus according to claim 26, wherein:

the optical disk apparatus reads information from or records information in multiple types of disks;

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the optical disk apparatus includes detection means for detecting the type of disk; and

the optical disk apparatus conducts/does not conduct power control for the light source of the optical beam based on the calculation result, or changes an operation mode according to the type of disk detected by the detection means or a duration of recording/reproduction of data or a duration of power control.

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